Titan Lake Simulation Chamber

Completed Technology Project (2016 - 2018)

Project Introduction

We will modify the existing Titan Lakes Simulation System (TiLSS), currently designed to study the composition of Titan's lakes in equilibrium with the atmosphere, to allow for more detailed analysis of Titan fluid physical and chemical properties. The system will be upgraded to enable the testing of fiber optic instruments designed to perform chemical analysis of Titan lake fluids, and to enable visual observation of the fluid for studies of bubble and particle motion.

These experiments will demonstrate the use of the Titan chamber as a platform for the testing of various technologies related to lake lander design and in situ chemical analysis of lake fluids. The fiber optic probes will be tested entirely under relevant Titan surface conditions (94 K, 1.5 bar), increasing TRL for this component to 5. The addition of a visual observation capability will allow for experiments on the exsolvation of dissolved gases (such as nitrogen) on heating of Titan lake fluids. The nitrogen exsolvation experiments will provide critical information necessary for design of lake landers and sampling systems.

Anticipated Benefits

This work will enable the further testing of instrument concepts and technologies for future Titan in situ missions, including the testing of surface liquid sampling methodologies. In addition, we will be able to study fundamental properties of hydrocarbon fluids necessary for the design of Titan lake landers, such as the dynamics of bubble and particle motion. These capabilities will be unique to JPL, and will allow for informed design and development of technology for future New Frontiers Titan missions. With the announcement of the Ocean Worlds (Titan and Enceladus) theme of the New Frontiers program, the utility of a facility for testing of instrument and spacecraft components under relevant Titan surface conditions becomes apparent.

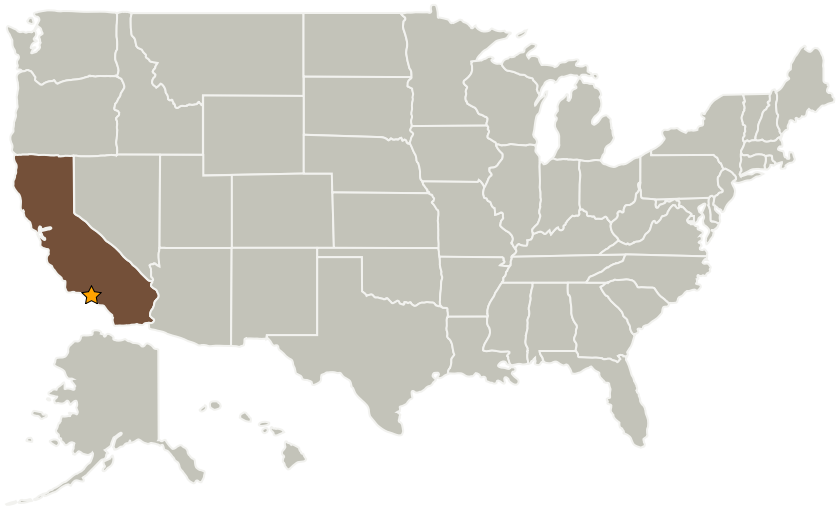
JPL_IRAD_Activities Project

Table of Contents

Titan Lake Simulation Chamber

Completed Technology Project (2016 - 2018)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

Fred Y Hadaegh

Principal Investigator:

Robert P Hodyss

Co-Investigators:

Mathieu N Choukroun
Ahmed Mahjoub

Titan Lake Simulation Chamber

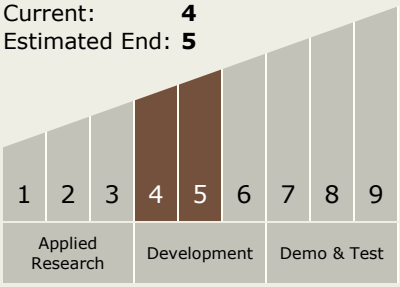
Completed Technology Project (2016 - 2018)

Images

JPL_IRAD_Activities Project Image
JPL_IRAD_Activities Project
(https://techport.nasa.gov/image/27780)

Technology Maturity (TRL)

Start: **4**
Current: **4**
Estimated End: **5**



Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.2 Descent
    - TX09.2.1 Aerodynamic Decelerators

Target Destinations

Others Inside the Solar System, Foundational Knowledge

Supported Mission Type

Push